

LOCK SHOE SYSTEM

[0001] This application claims the benefit of U.S. Provisional Application No. 60/416,378, filed 10/05/2002.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] The invention pertains to counterbalanced movable or removable closures, more particularly to an interlocking jamb mounted locking shoe and sash mounted locking pivoted support arm system.

2. Description of the Prior Art

[0003] U.S. Patent No. 2,796,630 patented June 25, 1957 by G. B. Haas describes a self-locking sash balance in which a plunger from the sash rests upon a first radial side of a tripping lever that is pivotally mounted on a shoe that is biased upward by a balance spring. The second radial side of the tripping lever engages a pivoted detent so that when the plunger applies weight of the sash upon the first radial side, the second radial side presses upward on one side of the detent, rotating the other side of the detent out of biting engagement with a vertical side of the track in which the shoe rides.

[0004] U.S. Patent No. 4,799,333 patented January 24, 1989 by Westfall et al. describes a lock shoe system for a take-out window in which a horizontal pin from the sash pushes back a biter knife lever pivotally mounted on the balance shoe so that the knife disengages from the vertical track in which the shoe slides.

[0005] U. S. Patent No. 5,189,838 patented March 2, 1993 by N. R. Westfall describes a tilt sash lock shoe system in which an elongated sash pin can be lowered into or lifted vertically from a slot formed by confronting first and second vertical surfaces. The first vertical surface is a wall of the shoe. The second vertical surface is on a pivoted element that has a biting edge on one side of the pivoted element, that is rotated against the window track by upward force of the system's counter balance spring on the other side of the pivoted element. When the sash is tilted from the vertical with the pin in the shoe, or when the sash is removed from the window, the biting edge presses into the track. When the sash is vertical with an oblong end of the pin in the shoe, the oblong end forces the first and second vertical surfaces apart which rotates the pivoted element so that the biting edge is moved away from the track.

[0006] U.S. Patent No. 5,231,795, patented August 3, 1993 by N. R. Westfall describes a shoe designed to be supported by a spring counterbalance system, that is mounted on a jamb for vertical movement on the jamb. A lower outward corner of a sash rests on an inward extending platform extension of the shoe. A horizontally sliding bolt in the shoe is moved inward horizontally into a recess in the lower corner of the sash. Movement of the bolt is by a vertical pin eccentrically mounted on the top of a cylinder that rotates on a vertical axis. The cylinder is turned by a hex keyed hand tool from below the cylinder. In order to remove the sash from the window, the sash is moved down until an upward turned outer end of the bolt is below a downward depending lance that extends outward from the jamb in the direction of the sash. The bolt is slid outward so that when the sash is lifted, the shoe moves up until the outer end of the bolt catches under the lance. The sash, now free of the bolt, is then slid laterally off the platform for removal from the window frame.

[0007] U.S. Patent No. 6,041, 475 patented March 28, 2000 by M. J. Nidelkoff for a locking counterbalance shoe for tiltably removable sash windows describes a balance shoe in which a first element that is supported by the balance spring contains a second pivoted locking element having a serrated edge that grips the jamb track under the urging of an actuator spring between the first and second elements when there is no sash in the window frame. The second element

unlocks from the jamb track when the flat sash pin of a vertical sash rests upon the second element, compressing the actuator spring. When the sash is rotated from vertical, the flat sash pin turns the second element to the locking position wherein the serrated edge grips the jamb track.

## SUMMARY OF THE INVENTION

[0008] It is one object of the invention to provide a lock shoe system that locks the shoe to the jamb against upward movement of the shoe.

[0009] It is another object of the invention that the lock shoe system locks an arm, pivotally mounted on the sash, to the shoe.

[0010] Other objects and advantages will become apparent to one reading the ensuing description of the invention.

[0011] A lock shoe system for a window that includes a vertical jamb and a sash mounted in the window for movement up and down alongside the jamb, includes a balance shoe mounted on the jamb for vertical movement on the jamb, a platform on the balance shoe configured for vertical support of an item on the platform when an item is on the platform, and a bracket fixedly mounted on the sash. A first arm mounted on the bracket for rotating about a first axis is configured for transferring lift from a first end of the arm to the bracket, the first end of the first arm being on the platform. A second arm is mounted on the balance shoe for rotating about a second axis. A portion of the second arm spaced from the second axis includes a second end configured for hooking to the jamb at at least one height along the vertical height of the jamb when the second arm is at a first rotary position of the second arm, the portion comprising a third end configured for extending through a first opening in the platform and through a second opening in the first arm when the second arm is at a second rotary position of the second arm.

The second arm includes means on the second end for locking the third end in the second opening. The second axis is preferably parallel to the first axis.

[0012] U.S. Provisional Application Serial No. 60/416,378, filed 10/05/2002 is hereby incorporated herein in its entirety by reference.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0013] In order that the invention be more fully comprehended, it will now be described, by way of example, with reference to the accompanying drawings, in which:

[0014] FIG. 1 is a right side perspective view of a lock shoe system according to the invention showing the sash support arm on the shoe saddle, locked to the shoe.

[0015] Fig. 2 is a left side perspective view of the assembly of Fig. 1.

[0016] Fig. 3 is a right side perspective view from adjacent to the front of the system showing the system locked as in Fig. 1, mounted on a jamb and sash of a window.

[0017] Fig. 4 is a right side perspective view from adjacent to the back of the system showing the locked, mounted system of Fig. 3. In this view, a spring balance is visible.

[0018] Fig. 5. is a right side perspective view of the lock system of Fig. 1 showing the shoe locked to the jamb against upward movement of the shoe, and the sash support arm disconnected from the shoe.

[0019] Fig. 6 is a left side perspective view of the assembly of Fig. 5.

[0020] Fig. 7 is a right side perspective view from adjacent to the front of the system showing the shoe mounted on the jamb, locked to the jamb against upward movement, and the sash support arm and bracket disconnected from the shoe, mounted on a sash that is raised above the saddle of the shoe.

[0021] Fig. 8 is a right side perspective view from adjacent to the back of the system of Fig. 7.

[0022] Fig. 9 is a right side view of the shoe arm.

[0023] Fig. 10 is a rear view of the shoe arm of Fig. 9 taken at 10-10.

[0024] Fig. 11 is a right side view of the spring clip receiver for the shoe arm.

[0025] Fig. 12 is a front view of the spring clip receiver of Fig. 11.

[0026] Fig. 13 is a right side view of the sash support arm.

[0027] Fig. 14 is a right side perspective view of the sash support arm pivotally mounted on a sash on a pin through a portion of the sash.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0028] Before explaining the invention in detail, it is to be understood that the invention is not limited in its application to the detail of construction and arrangement of parts illustrated in the drawings since the invention is capable of other embodiments and of being practiced or carried out in various ways. It is also to be understood that the phraseology or terminology employed is for the purpose of description only and not of limitation.

[0029] Referring to Figures 1-4, and 9-13, shoe 34 of assembly 30 is slidingly mounted on jamb 38.

[0030] The shoe is supported vertically by spring balance 40 by way of cross pin 32 in downward open U shaped hooks 36.

[0031] Shoe 34 bears part of the weight of sash 46 which travels up and down between two jambs of a window. It is expected that another assembly according to the invention would be mounted on an opposite side of the sash and connected to the jamb adjacent to that side of the sash, also bearing part of the weight of the sash. For the purpose of description of the invention only one assembly on one side of the sash is shown and described. It should be understood that the other assembly preferably would be a duplicate of the one herein described.

[0032] The present invention will safely support and lock heavy steel and glass sashes such as those found in factories and lofts, as well as lighter wood or plastic sashes.

[0033] Bracket 50 is mounted on sash 46, screwed into stile 52 by screws 54 through mounting holes 56.

[0034] Sash support arm 60 rotates on pin 62 on axis 64 in pivot holes 66 and 68.

[0035] Shoe arm 70 rotates on pin 72 on axis 74. Pin 72 passes through upward open C-shaped bearings 80, 82 in shoe 34, and downward open C-shaped bearing 86 in shoe arm 70.

[0036] Shoe arm 70 is latched by notch 88 and protrusion 92 of arm 70 in spring clip 90 opening 94.

[0037] Clip 90 is preferably made of steel.

[0038] Curved hook 100 of shoe arm 70 extends through opening 104 in platform 110 of the shoe, and into and preferably through opening 112 in arm 60 of bracket 50. The curve of hook 100 is such that the curve prevents arm 60 from moving axially parallel to axis 64, laterally normal to axis 64, and upward or downward from platform 110. This prevents bracket 50 and the portion of the sash to which bracket 50 is attached from moving outward from the window axially, away from the jamb normal to axis 64, downward past the platform, or upward past the platform.

[0039] End 96 of arm 60 extends further from axis 64 than distance 98 of the shortest radius of axis 64 to the surface of bracket 50 so that arm 60 is prevented from rotating up to horizontal by impingement of end 96 against the bracket above the horizontal level of axis 64, so that lift expressed on end 124 by platform 110 is transferred to axis 64 by arm 60 when arm 60 is prevented from rotation by impingement of end 96 against the bracket. It should be understood that this may comprise a protrusion of the surface of the bracket that prevents rotation of arm 60 so that lift expressed on end 124 by platform 110 is transferred to axis 64 by arm 60 when arm 60 is prevented from rotation by impingement of end 96 against the protrusion.

[0040] Preferably the top 106 of arm 60 at end 96 extends farther from axis 64 than the bottom of the arm.

[0041] Sash 46 containing glass 47, locked to shoe 34 by this configuration moves up and down with the shoe.

[0042] Preferably the curve of hook 100 is on a radius 102 taken from axis 74, that is, a portion of the circumference of a circle about axis 74, shown in Fig. 5.

[0043] Spaces 114, 116 between end 118 of curved hook 100 and the horizontally 115 and downward 117 facing adjacent surfaces 120 and 121 of the shoe are smaller than the thickness 122 of arm 60 from opening 112 to end 124 that extends into the shoe.

[0044] Preferably the distance between end 118 of hook 100 and the closest surface of the shoe when hook 100 is in opening 112 and shoe arm 70 is latched in clip 90 is smaller than the thickness 122 of arm 60 such that arm 60 cannot slip past end 118 between end 118 and the closest surface of the shoe to end 118.

[0045] Referring to Figures 5 -13, bracket 50 is screwed into the side of the sash at about the lowest part of the sash with arm 60 hanging down, or vertical, from axis 64. Shoe arm 70 is detached from spring clip 90 by bending the clip away 128 from engagement with notch 88, and is rotated on axis 74 until end 130 extends into opening 132 in wall 134 of jamb 38. This rotates curved hook 100 out of opening 112 and vertical opening 104.

[0046] Shoe arm 70 hooks in opening 132 by the upward force of the shoe applied to shoe arm 70. Preferably opening 132 is used for hooking of arm 70 to the jamb. Hooking to the jamb of the arm rotated against the jamb can be to a protrusion on the jamb caught by the arm so long as the protrusion does not interfere with operational sliding of the shoe in the jamb for unlocked vertical movement of the sash.

[0047] In Fig. 14, arm 60 is mounted on pin 62 through holes 142, 144 in sash 46. Arm 60 rotation is limited by impingement of end 96 against wall 148 so that lift expressed on end 124 by platform 110 is transferred to sash 46 by way of arm 60 and pin 62.

[0048] Steps for installing the system and sash on a window jamb include:

[0049] 1. Screw bracket 50 into side 136 of sash 46 at approximately the lowest part of the sash with arm 60 hanging down or vertically from pin 62.

[0050] 2. Detach shoe arm 70 from clip 90. Preferably shoe arm 70 is shipped with shoe arm 70 locked in clip 90.



[0051] 3. Mount the shoe 34 on jamb 38 with shoe arm 70 hanging down from pin 72.

[0052] 4. Mount balance 40 on the jamb.

[0053] 5. Crank the balance to load its internal spring.

[0054] 6. Put rod 140 and cross pin 32 in hooks 36.

[0055] 7. Slowly let the balance lift the shoe until end 130 of shoe arm 70 which is biased against wall 134 of the jamb by the rotational vector of weight of the shoe arm, catches in opening 132, hooking in the slot from the upward thrust of the shoe on the shoe arm.

[0056] 8. Mount the sash on the jamb and bring the sash down until arm 60 sits on platform 110.

[0057] 9. Push the sash down until shoe arm 70 end 130 can be moved out of opening 132.

[0058] 10. Rotate shoe arm 70, moving curved hook 100 through openings 104 and 112 until shoe arm 70 snaps into clip 90 opening 94 by way of notch 88 and protrusion 92.

[0059] Steps for removing the sash from the window jamb include:

[0060] 1. Move the sash down so that shoe arm 70 is lower than opening 132 in the jamb.

[0061] 2. Release the shoe arm from clip 90 so that the shoe arm rotates under its own weight toward jamb wall 134 so that end 130 rests against the jamb wall and curved hook 100 moves down out of openings 112 and 104 which frees arm 60 from shoe 34.

[0062] 3. Move the sash up until end 130 moves into opening 132 and hooks there by upward

force of the shoe.

[0063] 4. Remove the sash from the jamb.

[0064] Although the present invention has been described with respect to details of certain embodiments thereof, it is not intended that such details be limitations upon the scope of the invention. It will be obvious to those skilled in the art that various modifications and substitutions may be made without departing from the spirit and scope of the invention as set forth in the following claims.

[0065] What is claimed is:

## Drawing designators (informal list)

- 30 assembly
- 32 cross pin
- 34 shoe
- 36 hooks, downward, U-shaped
- 38 jamb
- 40 spring balance
- 46 sash
- 47 glass
- 50 bracket
- 52 stile
- 54 screw
- 56 mounting hole
- 60 sash support arm
- 62 pin
- 64 axis
- 66 pivot hole
- 68 pivot hole
- 70 shoe arm
- 72 pin
- 74 axis
- 80 bearing, upward open, C-shaped
- 82 bearing, upward open, C-shaped
- 86 bearing, downward open, C-shaped
- 88 notch
- 90 clip, spring
- 92 protrusion
- 94 opening

96 end of arm 60  
98 distance  
100 curved hook  
102 radius  
104 opening  
106 top  
110 platform  
112 opening  
114 space  
115 horizontally  
116 space  
117 downward  
118 end  
120 surface  
121 surface  
122 thickness  
124 end  
128 away  
130 end  
132 opening  
134 wall of jamb  
136 side  
140 rod  
142 hole  
144 hole  
148 wall